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PREDICTIVE VALIDITY OF VOCATIONAL ENTRY MEASURES AND A VOCATIONAL EDUCATION SUMMATIVE CRITERION FOR LD ADOLESCENTS' SUCCESS IN VOCATIONAL PROGRAMS

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The University of Kansas Institute for Research in Learning Disabilities is supported by a contract (#300-77-0494) with the Bureau of Education for the Handicapped, Department of Health, Education, and Welfare, U. S. Office of Education, through Title VI-G of Public Law 91-230. The University of Kansas Institute, a joint research effort involving the Department of Special Education and the Bureau of Child Research, has specified the learning disabled adolescent and young adult as the target population. The major responsibility of the Institute is to develop effective means of identifying learning disabled populations at the secondary level and to construct interventions that will have an effect upon school performance and life adjustment. Many areas of research have been designed to study the problems of LD adolescents and young adults in both school and non-school settings (e.g., employment, juvenile justice, military, etc.)

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Cooperating Agencies

Were it not for the cooperation of many agencies in the public and private sector, the research efforts of The University of Kansas Institute for Research in Learning Disabilities could not be conducted. The Institute has maintained an on-going dialogue with participating school districts and agencies to give focus to the research questions and issues that we address as an Institute. We see this dialogue as a means of reducing the gap between research and practice. This communication also allows us to design procedures that: (a) protect the LD adolescent or young adult, (b) disrupt the on-going program as little as possible, and (c) provide appropriate research data.

The majority of our research to this time has been conducted in school settings in both Kansas and Missouri. School districts in Kansas which have participated or currently are participating in various studies include: Unified School District (USD) 437 Auburn-Washburn; USD 384, Blue Valley; USD 204, Bonner Springs; USD 308, Hutchinson; USD 500, Kansas City; USD 469, Lansing; USD 497, Lawrence; USD 453, Leavenworth; USD 480, Liberal; USD 233, Olathe; USD 290, Ottawa; USD 305, Salina; USD 450, Shawnee Heights; USD 512, Shawnee Mission; USD 464, Tonganoxie; USD 202, Turner; and USD 501, Topeka. Interlocal agencies in Kansas which have participated include: the Central Kansas Cooperative in Education, Salina; the East Central Kansas Special Education Cooperative, Paola; and the South Central Kansas Special Education Cooperative, Pratt. Parochial schools involved in our studies include: Bishop Miege High School, Shawnee Mission; Bishop Ward High School, Kansas City, Kansas; and O'Hara High School, Kansas City, Missouri. The Kansas State Department of Education also has been helpful in our research efforts.

Studies are also being conducted in several school districts in Missouri, including Center School District, Kansas City; the New School for Human Education, Kansas City; the Kansas City, Missouri School District; the Lee's Summit School District; the Raytown School District; and the School District of St. Joseph. In addition, school districts in Beaverton, Oregon; Delta County, Colorado; Elkhart, Indiana; Houston, Texas; Jonesboro, Arkansas; Montrose County, Colorado; Omaha, Nebraska; and Ottumwa, Iowa, have also participated in our studies. The Iowa Department of Public Instruction also has been helpful in our research effort.

Agencies currently participating in research in the juvenile justice system are the Overland Park, Kansas Youth Diversion Project; the Douglas, Johnson, Leavenworth, and Sedgwick County, Kansas Juvenile Courts; and the judicial district serving the Pittsburgh-Parsons, Kansas area. Other agencies which have participated in out-of-school studies are: Penn House and Achievement Place of Lawrence, Kansas; Kansas State Industrial Reformatory, Hutchinson, Kansas; the U. S. Military; and Job Corps. Numerous employers in the public and private sector have also aided us with studies in employment.

While the agencies mentioned above allowed us to contact individuals and supported our efforts, the cooperation of those individuals--LD adolescents and young adults; parents; professionals in education, the criminal justice system, the business community, and the military--have provided the valuable data for our research. Our sincere appreciation is expressed to all those who have contributed information to our research effort. This information will assist us in our research endeavors that have the potential of yielding greatest payoff for interventions with the LD adolescent and young adult.

Abstract

Historically, adolescents with specific learning disabilities (SLD) have been denied entry into vocational education programs due to vocational educators' negative assumptions about such students in terms of: (a) career choice, (b) academic skills, and (c) social behavior. In the present study, three instruments were administered to 21 SLD and 21 nonhandicapped students to measure their entry-level skills in these three areas. Entry scores were compared to summative grades earned in a regular vocational course.

The results indicated that there were no significant differences between the mastery and non-mastery groups on entry scores. The mathematic scores on the Basic Skills Assessment and the Career Maturity Inventory score were found to be significantly related to the vocational course grade for the nonhandicapped group. Although confidence intervals for the proportions of each group who reached mastery showed that a smaller proportion of the LD group reached mastery, the confidence bands of the two groups overlapped to a great extent. Thus, it was concluded there was no significant difference between the proportion of SLD and the proportion of nonhandicapped students who reached mastery levels in a regular vocational course. That is, once LD secondary-level students enter vocational training programs, their success appears related neither to their academic deficiencies nor to their classification as LD.

PREDICTIVE VALIDITY OF VOCATIONAL EDUCATION ENTRY MEASURES AND A VOCATIONAL EDUCATION SUMMATIVE CRITERION FOR LD ADOLESCENTS' SUCCESS IN VOCATIONAL PROGRAMS

To date, special needs programs in the public schools have provided inappropriate vocational options for learning disabled (LD) adolescents. Typically, these students have received vocational training through programs designed for the mentally handicapped although no empirical evidence proves that these programs are effective with LD youth (Carlson, 1977).

Three major assumptions related to career choice, academic skills, and social behavior (Davison, 1979; Parrish, 1978; Sherrell, 1978; Swinney, 1978) appear to underlie this practice which has often prevented LD adolescents from realizing their potential in skilled or technical occupations. Choosing a career is a haphazard process for many handicapped students, particularly those who have not had the benefit of adequate career education programs. A realistic knowledge of one's self combined with prudent decision making in an environment "allowing free choices is primary to career selection" (Crites, 1969, p. 134). Yet vehicles for facilitating career choice currently are not available for most LD students. In terms of academics, LD students historically have been denied admittance into regular vocational programs because vocational teachers have assumed that they were incapable of meeting the necessary academic competencies. No data are available to support this assumption; however, since academic competencies have not been studied empirically for their predictive value based on the summative grades earned by LD students in regular vocational courses.

Finally, LD adolescents have encountered difficulty entering regular vocational programs because vocational teachers assumed that they demonstrated

unacceptable social behaviors, self-images, and/or emotional control (Wilcox, 1970). Although social deficits have been observed in LD students, no empirical research data have determined the relationship among social skills and vocational program success.

As a result of such negative and unvalidated assumptions, vocational educators have excluded LD adolescents from regular vocational instruction, and thereby have deprived these students of occupational alternatives available to their nonhandicapped peers. Studies conducted on entry level requirements for LD students in vocational agriculture (Parrish, 1978), home economics (Swinney, 1978), and automechanics (Davison, 1979) revealed disagreement among vocational educators in the three areas on academic entry requirements. A literature search led to no conclusive evidence to suggest that LD students differ significantly from nonhandicapped vocational students on academic tasks; however, social skills were found to be a requirement for success in special vocational training and in maintaining a job (Davison, 1979; Parrish, 1978; Swinney, 1978).

Purpose

The purpose of the present study was to determine the association between students' scores on assessment instruments measuring three specific types of entry-level abilities and their summative grades assigned by vocational educators.

Methodology

Setting

This investigation was conducted in the vocational education cooperative of two rural school districts located in adjoining counties in western Colorado. One school district served a general population of 16.55 persons per square mile, while the other district served a general population of 9.87 persons per

square mile. No other vocational school was accessible to secondary students in this geographic area. The major sources of employment in this area consisted of agriculture, mining, small manufacturing industries, and large hydroelectric power generating plants.

Subjects

Due to the size of the two participating school districts, all LD senior high-school students enrolled in several vocational programs were potential subjects. The district criteria for LD classification were: (a) an intelligence quotient within the average range on the WISC-R, WAIS, or Stanford-Binet; (b) deficiency of at least two years in reading, mathematics, and/or writing achievement; (c) an adaptive behavior rating score ruling out emotional disturbance as the primary disability; and (d) a staffing consensus on the LD classification.

Those students of the LD subject pool who volunteered to participate in the study were given a consent form for parental signature. The 21 students (16 males, 5 females) who returned signed consent forms formed the LD sample. Subjects represented grades 10-12 and several vocational programs (see Tables 1 and 2). The school district LD classification was validated by three LD experts using the criteria and procedures developed at the University of Kansas Institute for Research in Learning Disabilities (KU-IRLD) (Schumaker, Warner, Deshler & Alley, 1980).

Students in the nonhandicapped control group were enrolled at the vocational school either in programs attended by LD students or in programs specifically designed for senior-high school students. A list of potential control group participants was obtained from the vocational school principal. The criteria for inclusion in the control group included: (a) no record of suspected handicapping condition, and (b) enrollment in grades 10 through 12. Subjects were validated as non-LD by KU-IRLD procedures.

In addition, potential control group members were to volunteer and to obtain a signed parental consent form in order to be considered for participation. A total of 21 subjects were included in the control group. These 21 students (18 males, 3 females) formed the nonhandicapped sample; subjects represented grades 11 and 12 and seven vocational programs (see Tables 1 and 2).

The mean IQ scores of each group are presented in Table 3. All IQ data were collected from the students' cumulative records. LD subjects' scores were obtained from the Wechsler Intelligence Scale for Children-Revised or the Stanford-Binet Individual Intelligence Test, both of which were individually administered. The IQ scores of the nonhandicapped group were obtained from the Henmon-Nelson Test of Mental Ability, a group mental evaluation instrument. The mean IQ score of the LD group was more than one standard deviation below that of the control (nonhandicapped) group.

Table 4 shows the age distribution of each group. Although the mean age of the LD group was similar to that of the nonhandicapped group, the LD group's standard deviation was greater, possibly because LD tenth graders were included in the vocational program.

Measurement Systems

The Career Maturity Inventory (CMI) was used to assess decision making in career choices (Crites, 1978). The CMI is composed of two separate forms, the Attitude Scale and the Competence Test; only the former was used in this study.

The CMI Attitude Scale, Form B-1, was selected for this research because it is designed to "elicit the feelings, the subjective reactions, the dispositions that the individual has toward making a career choice and entering the world of work" (Crites, 1978, p. 3). The scale surveys five attitudinal

variables, i.e., decisiveness, involvement, independence, orientation, and compromise in career decision-making. Estimates of internal consistency were provided by the Kuder-Richardson (Formula 20). The mean coefficient across scales (1.64) is similar to coefficients obtained on other heterogeneous attitude surveys (Crites, 1978).

The Basic Skills Assessment (BSA) was used to measure the minimal academic competencies required of all high-school graduates (Educational Testing Service, 1978). The test is composed of three separate multiple-choice examinations, i.e., Reading, A Writer's Skills, and Mathematics. The Reading section includes items that test the student's literal-comprehension and inference skills as a consumer, learner, citizen, protector, and producer. A Writer's Skills section includes items testing the student's skills in mechanics of writing and effectiveness of expression. The items on the Mathematics section measures skills of computation and applications. The Kuder-Richardson Formula 20 was computed to provide the internal consistency of the three examinations. For the Reading test, a reliability coefficient of .94 was obtained; for A Writer's Skills, the coefficient ranged from .94 to .95; and for Mathematics, .92 to .94. The total BSA score reliability coefficient was .91.

The Devereux Adolescent Behavior Rating Scale (DAB) (Spivak, Haines, & Spotts, 1967) was chosen to assess the subjects' social skills. The DAB identifies 15 behavioral factors; the scale is completed by adults who are familiar with the student and his/her behaviors. In the present investigation, both LD teachers and vocational educators completed the scale, but only those responses applicable to the Poor Emotional Control factor were used, since they related most directly to the characteristics of LD students described in the literature (Bryan & Bryan, 1978; Hallahan & Kauffman, 1976; Mercer, 1979). Internal consistency reliability coefficients for the scale ranged form .40 to .86.

The summative criterion measure of this study was composed of a letter grade based on: (a) demonstration of competency by adequate performance on vocational skill tasks; (b) satisfactory examinations--written for the nonhandicapped group and oral for the LD group, (c) compliance with the hourly attendance requirement; (d) achievement on performance tests; and (e) general attitude and cooperativeness. The letter grades which ranged from A to D were determined by the vocational educator. For the purposes of this study, two arbitrary decisions regarding grades were made. First, the letter grades were divided into two groups (A-B and C-F). Students earning A or B grades were assigned to the Mastery group, while students who either dropped the vocational course or earned grades of C, D or F constituted the Nonmastery group.

Procedures

Initial testing of the LD subjects was conducted by the principal investigator during a 50-minute period at each of the two sites. All other testing was conducted by district staff. To ensure consistency of test administration, this investigator trained each staff member in the administration of the BSA, CMI, and DAB.

The principal investigator administered the BSA to the control group, whereas the special educator assigned to the vocational school administered the CMI to the control group and supervised the completion of the DAB by individual vocational educators. All instruments were completed three weeks after initiation of the investigation. The summative grade for each student was obtained by the investigator from the counselors of each participating high school at the close of the school term.

Research Design

The instruments chosen for this investigation provided data for studying the relationship between variables measured at entry into vocational education

and a holistic summative criterion measure of a mastery-level grade in a vocational course. A correlational rather than an experimental design was chosen because the purpose was "to investigate the extent to which variations in one factor correspond with variations in one or more other factors based on correlation coefficients" (Isaac & Michael, 1977, p. 21).

Statement of Hypotheses

The following null hypotheses were tested:

1. There is no significant relationship between scores on the Career Maturity Inventory and achieving or not achieving a mastery-level grade in a vocational course.

2. There is no significant relationship between scores on the Basic Skills Assessment and achieving or not achieving a mastery-level grade in a vocational course.

3. There is no significant relationship between scores on the Poor Emotional Control subsection of the Devereux Adolescent Behavior Rating Scale and achieving or not achieving a mastery-level grade in a vocational course.

4. The proportion of LD students achieving a mastery-level grade in a vocational course is not different from the proportion of nonhandicapped students achieving such a grade.

Data Analysis

In order to test the first three null hypotheses and thereby make inferences about differences between the mastery and nonmastery groups, the groups were compared on five variables: the CMI score, three BSA scores, and the Poor Emotional Control score from the DAB. In addition, the groups were compared on age and IQ to rule out these variables as possible causes of group differences on the first five variables. Thus, the mastery and nonmastery groups were compared on a total of seven variables.

Since multiple comparisons were made upon the same sample, a method was needed to control for Type I error rate (alpha). The first three null hypotheses were tested using two criteria. The first criterion was based on the work of Hummel and Sligo (1971) who studied error rates for multivariate data by a series of simulations. Hotelling's T^2 statistic, a multivariate test, was used to test the difference between group centroids. If T^2 was significant (at alpha equal to .05) then univariate *t*-tests were to follow, each based upon an alpha of .05 per comparison.

The second approach to the error rate problem consisted of dividing the desired maximum experiment-wise alpha by the number of comparisons (.05/7). Thus, even if a single comparison was not found to be significant by the Hummel and Sligo procedure, it might be found significant using multiple *t*-tests with a per-comparison Type I error rate.

The fourth null hypothesis was evaluated using the Chi-square test for the difference between two proportions. Alpha was set equal to .05.

Results

No significant difference on the Hotelling's T^2 was found between the mastery and nonmastery groups. The descriptive statistics of the two groups on the seven variables are presented in Table 5. Table 6 shows the means and standard deviations for each variable, the results of the multivariate, Hotelling's T^2, and univariate tests are presented in Table 7. Results of applying the second criterion, in which each univariate *t* was assessed at alpha equal to .007 (i.e., .05/7), were the same as those for the first criterion.

Post hoc analyses were conducted using multiple-regression procedures. Rather than applying the mastery-nonmastery criterion, actual grades (F to A were assigned values of 0 to 4, respectively) were used as dependent variables for each of the original sample groups, i.e., LD and nonhandicapped students.

The Mathematics and the CMI scores were chosen as independent variables since these two variables had the highest t-values among the variables listed in Table 7.

Two regression analyses were computed--one for the LD group and one for the nonhandicapped group. The results of these analyses are presented in Table 8. For the LD groups, no statistically significant relationship (alpha = .05) between school grades and the independent variables was found (R = .51; F = 3.18; df = 2,18; p = .07).

For the nonhandicapped group, however, a statistically significant relationship was found between grades and the independent variables, Mathematics and CMI (R = .79; F = 14.68; df = 2,18; p = .0002). The R^2 associated with this latter analysis was adjusted for shrinkage using procedures recommended by Ferguson (1976).

Twelve of the 21 LD students included in this study received a mastery-level grade, while 15 of the 21 nonhandicapped students received a mastery-level grade; the respective proportions were .57 and .71. Using the Chi-square statistic with alpha set equal to .05, these proportions were not found to be significantly different (Chi-square = .93; df = 1; N.S.).

Discussion

Conclusions

The first major research question of this study was: Do mastery and non-mastery groups differ with respect to three major competencies, i.e., career decision making, academic skills, and social behavior? Results indicated that there were no significant differences between the groups in the three competency areas measured by the Attitude Scale of the CMI for career decision making, the BSA for academic skills, and the DAB for social conduct.

The second major research question of this investigation was: Do LD and nonhandicapped groups differ with respect to the proportion of each group that reach mastery level as determined by the summative grade in a vocational course? Mastery was set at grade level of B or above. Since confidence intervals for the proportion of each group reaching mastery was found to show considerable overlap, it was concluded that there was no difference in the proportion of LD and nonhandicapped students who reached mastery level in a regular vocational course. Post hoc analyses revealed that the score on the Mathematics section of the BSA and the CMI score were highly predictive of grades for the nonhandicapped group.

No significant difference was found between the groups of LD adolescents and nonhandicapped peers on the CMI attitude scale--an indication of LD students' commitment to realistic career decisions. These data are not dissimilar to those of Bingham (1978), who found the CMI Attitude Scale scores of the LD subjects in her investigation to be comparable to nonhandicapped peers.

The findings of the present study warrant serious consideration by educators in home economics and vocational agriculture who typically regard LD adolescents to be deficient in the academic skills necessary for entry into their programs (Parrish, 1978; Swinney, 1978). Both LD and nonhandicapped vocational students in the present investigation were found to demonstrate reading competencies far below their attained grade placement.

Although scarce, available data on the social skills of LD youths in vocational settings indicate that LD students exhibit inappropriate social behavior (Bryan, 1975; Gordon, 1969; Greenberg, 1970; Kosmakos & Decker, 1977; Kronick, 1978) compared to their nonhandicapped age peers. Yet, the findings of the present study show that LD adolescents' social behavior, as measured on the DAB, is comparable to that of their nonhandicapped age peers enrolled in vocational programs.

Results of this investigation do not explain why LD group members earned mastery-level grades. Possible reasons for their success include: (a) the unique nature of the methodology of vocational courses emphasized nonacademic activities, e.g., hands-on manipulative experiences with machinery, media, and other equipment, and provided numerous student opportunities to imitate the teacher; (b) test formats included practical application of skills rather than the traditional testing procedure of reading test items and writing answers; and (c) the content of the vocational course was obtainable by means other than reading, i.e., audiovisuals, demonstrations, working models, practice with functional equipment, and discussions. These teaching techniques also may have positive motivational effects on LD students as evidenced by the finding that none of the LD subjects withdrew from the vocational program.

Limitations

Sample selection system. The method by which subjects were chosen for this investigation represents biased sampling: The LD group members were predetermined by the school district procedures for special services placement, while the nonhandicapped group was comprised of volunteers rather than randomly selected subjects.

Sample size. Generalization of the findings of the present investigation is limited by the small number of subjects. Based upon the selection criteria, the results are generalizable only to secondary students who (a) receive school-district LD services, (b) are enrolled in a regular vocational education program, and (c) have rural and socioeconomic backgrounds similar to those of the subjects in the present study.

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Table 1

Number of Participants

Per Group at Each Grade Level

Grade	LD	Nonhandicapped
10	8	0
11	7	10
12	6	11

Table 2

Number of Participants Per Group

Enrolled in Each Vocational Course

Vocational Course	LD	Nonhandicapped
Vocational Agriculture	3	0
Work-Study (Cooperative)	5	0
Auto Mechanics	2	0
Drafting	1	0
Food Service	4	0
Carpentry/Building Trades	1	5
Nursing Aide	1	0
Welding	3	6
Vocational Typing	1	0
Basic Engines	0	6
Office Occupations	0	1
Distributive Education	0	1
Vocational Accounting	0	1
Diesel Engines	0	1

Table 3

Means and Standard Deviations of IQ Scores

for LD and Nonhandicapped Students

Group	N	Mean	SD
LD	21	90.45	13.40
Nonhandicapped	21	108.30	10.41

Table 4

Mean and Standard Deviations of Age in Months

for LD and Nonhandicapped Participants

Group	N	Mean	SD
LD	21	210.33	12.72
Nonhandicapped	21	211.86	8.12

Table 5

Descriptive Statistics by Variable for LD and Nonhandicapped Groups

	N	Minimum Obtained Score	Maximum Obtained Score	Mean	SD	SEM
IQ						
LD	21	72	118	90.67	13.10	2.86
Nonhandicapped	21	90	128	108.29	10.15	2.21
Mathematics						
LD	21	11	32	18.00	6.68	1.46
Nonhandicapped	21	10	40	30.57	6.71	1.46
Reading						
LD	21	6	11	8.67	1.56	0.34
Nonhandicapped	21	9	12	11.14	0.96	0.21
Sriter's Skills						
LD	21	0	15	9.14	4.62	1.01
Nonhandicapped	21	12	17	15.29	1.49	0.32
Poor Emotional Control						
LD	21	-1.50	1.25	-0.29	0.85	0.18
Nonhandicapped	21	-1.75	1.25	-0.84	0.79	0.17
Age (Months)						
LD	21	186	232	210.33	12.71	2.78
Nonhandicapped	21	200	226	211.86	8.12	1.77
CMI						
LD	21	13	45	31.76	8.03	1.75
Nonhandicapped	21	26	46	37.48	4.73	1.03

Table 6

Descriptive Statistics for Mastery and Nonmastery Groups on Seven Variables

Variables	Maximum Obtained Score	Minimum Obtained Score	Mean	SD	SEM
IQ					
Mastery	128	72	100.81	15.79	3.04
Nonmastery	120	79	97.07	12.35	3.19
Mathematics					
Mastery	36	11	26.63	8.74	1.68
Nonmastery	40	10	20.07	8.66	2.23
Reading					
Mastery	12	6	10.11	1.71	0.33
Nonmastery	12	6	9.53	1.92	0.496
Writer's Skills					
Mastery	17	4	13.00	3.88	0.75
Nonmastery	17	0	10.80	5.53	1.43
Poor Emotional Control					
Mastery	1.25	-1.75	-0.63	0.82	0.16
Nonmastery	1.25	-1.75	-0.45	0.95	0.24
Age					
Mastery	230	192	211.30	9.38	1.80
Nonmastery	232	186	210.73	12.79	3.30
CMI					
Mastery	46	23	36.41	7.29	1.88
Nonmastery	42	13	31.40	6.49	1.25

Table 7

Differences Between Mastery and Nonmastery Groups

on Seven Variables

Variables	Test	Obtained Value	df	p
IQ	t (pooled)	-0.79	40	0.43
	F (for variance)	2.08	1,40	0.16
Mathematics	t (pooled)	-2.34	40	0.02
	F (for variance)	0.53	1,40	0.47
Reading	t (pooled)	-1.00	40	0.32
	F (for variance)	0.17	1,40	0.69
Writer's Skills	t (Pooled)	-1.51	40	0.14
	F (for variance)	4.02	1,40	0.05
Poor Emotional Control	t (pooled)	0.65	40	0.52
	F (for variance)	0.18	1,40	0.68
Age	t (pooled)	0.16	40	0.87
	F (for variance)	3.34	1,40	0.08
CMI	t (pooled)	-2.29	40	0.03
	F (for variance)	0.00	1,40	0.98
Total Variables	Hotelling's T^2	13.43	7,34	0.16

Table 8

Multiple-Regression Analyses for the

LD and Nonhandicapped Groups

Statistic	Groups	
	LD	Nonhandicapped
Multiple *R*	.51	.79
Multiple R^2	.26	.62
R^2 Adjusted for Shrinkage		.58
Standardized Regression Coefficients		
BSA Mathematics		.47
CMI		.48